

Client's ref.:  
File: 7051-A20171usf

/2003-12-30  
/Yuchia

# **TITLE**

## **MESSAGE DEVICE**

### **BACKGROUND OF THE INVENTION**

#### **Field of the Invention**

5           The present invention relates to a massage device,  
and in particular to a massage device for massaging and  
stimulating the sole of the foot.

#### **Description of the Related Art**

10           In a conventional massage device disclosed by Japan  
patent No. 2001-224648, in order to provide foot massage  
and stimulation, an outer periphery thereof is protruded  
at an acute angle. A plurality of therapeutic rollers  
with circular, rigid arc-shaped elements having a radius  
of curvature of 10 mm to 15 mm are supported by rotating  
15           shafts. A locus of rotary motion of the rotating shafts  
is determined by uniquely shaped members. Each rotating  
shaft has a row of the therapeutic rollers provided  
thereon. A row of therapeutic rollers represents a  
therapeutic roller group, each row having cross sections  
20           according to the shape of the outer periphery of the  
uniquely shaped members. The rotating shafts move along  
the outer periphery of the uniquely shaped members. The  
shape of the outer periphery of the uniquely shaped  
members forms the locus of the motion of the rotating  
25           shafts. As a result, if the shape of the outer periphery  
of the uniquely shaped members conforms to the shape of a  
user's ankle and foot arch, the massage device unevenly

Client's ref.: /2003-12-30  
File: 7051-A20171usf /Yuchia

stimulates the bottom of toes and foot arch of the entire sole of the foot when placed thereon.

5 The conventional massage device stimulates the entire sole of the foot by upward force. Each foot, however, tends to move upward accordingly during massage. Thus, maintaining the position of a foot on the massage device and applying weight thereon provides uneven stimulation.

10 Hence, there is a need for a massage device providing effective foot massage and relatively better stimulation than the conventional massage device.

#### SUMMARY OF THE INVENTION

15 Thus, an object of the invention is to provide a massage device for effective foot massage and relatively better stimulation.

20 The present invention provides a massage device including a pair of therapeutic elements (or massaging elements) and a bottom therapeutic member. The therapeutic elements are rotated by a driving shaft, driven by a driving mechanism, to support and massage feet. The bottom therapeutic member is disposed between two therapeutic elements, for supporting an instep of a foot. The therapeutic elements are formed along an instep of a foot. Since the therapeutic elements are  
25 formed along the instep, the load is increased, and stimulation on the sole of the foot can be intensified, further preventing the foot from upward movement resulting in the foot slipping off the device. Thus, the present invention provides effective foot massage.

Client's ref.:  
File: 7051-A2017lusf

/2003-12-30  
/Yuchia

5       The present invention further has a protrusion  
disposed on a side of the therapeutic elements, facing  
the instep of a foot, abutted from above by the  
protrusion for massaging. Since the protrusion faces the  
instep of a foot on the therapeutic elements, the  
protrusion presses the instep from above. When the foot  
is massaged from above by the protrusion, the foot is  
prevented from slipping upward and off the device, while  
maintaining optimal foot position, effectively  
10       stimulating the foot.

At least two of the therapeutic elements are  
disposed along the longitudinal direction of the foot.  
Thus, the present invention can effectively massage the  
foot, according to shape.

15       The protrusion is an airbag. Accordingly, the  
protrusion corresponds to the foot in both shape and  
size, uniformly applying pressure over the entire foot.  
The airbag can be expanded, thus, decreasing the distance  
between two therapeutic elements, thereby restricting the  
20       foot, and providing an adequate massaging pressure.  
Furthermore, when the pressure of the airbag is greater  
than a certain value, the mechanical valve discharges  
excess compressed air for safety, thus, controlling  
stimulation and increasing durability.

25       The bottom therapeutic member has a roller, having a  
protrusion facing the sole of foot. Friction on the sole  
of the foot is reduced by the roller, providing adequate  
stimulation.

30       The bottom therapeutic member has a seat, having a  
protrusion facing and protruding against the sole of the

Client's ref.: /2003-12-30  
File: 7051-A2017lusf /Yuchia

foot. The protrusion of the seat applies adequate pressure on the sole of the foot, the feeling of which may be considered pleasurable.

5 The bottom therapeutic member has a protrusion, freely movable between a protruded position and a submerged position facing the sole of the foot of the patient. The protrusion of the bottom therapeutic member applies adequate pressure on the reflex points (acupressure points) on the foot, which may be considered  
10 therapeutic.

A detailed description is given in the following embodiments with reference to the accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

15 The present invention can be more fully understood by reading the subsequent detailed description and examples with references made to the accompanying drawings, wherein:

Fig. 1 is a perspective view of a massage device according to a first embodiment of the present invention;

20 Fig. 2 is a side view of Fig. 1 observed from direction A;

Fig. 3 is a top view of Fig. 2 observed from direction B;

25 Fig. 4 is a front view of Fig. 1 observed from direction C;

Fig. 5 is a front view of the therapeutic elements of Fig. 1;

Fig. 6 is a cross section of Fig. 5 taken along line ST-ST;

Client's ref.:  
File: 7051-A2017lusf

/2003-12-30  
/Yuchia

Fig. 7 is an exploded perspective view of the therapeutic element of Fig. 5;

Fig. 8 is a perspective view of the driving mechanism;

5 Fig. 9 is a cross section of Fig. 3 taken along line SA-SA;

Fig. 10 is a schematic cross section of Fig. 9 when the therapeutic elements are in an open position;

10 Fig. 11 is a cross section equivalent to Fig. 9 of the second embodiment according to the present invention.

Fig. 12 is a schematic cross section of Fig. 10 when the therapeutic elements are in an open position;

Fig. 13 is a cross section equivalent to Fig. 9 of the third embodiment according to the present invention;

15 Fig. 14 is a schematic cross section of Fig. 13 when the therapeutic elements are in an open position;

Fig. 15 is a front view equivalent to Fig. 3 of the fourth embodiment according to the present invention;

20 Fig. 16 is a cross section of Fig. 15 taken along line SB-SB;

Fig. 17 is a front view equivalent to Fig. 3 of the fifth embodiment according to the present invention; and

Fig. 18 is a cross section of Fig. 17 taken along line SC-SC.

25 **DETAILED DESCRIPTION OF THE INVENTION**

Figs. 1-10 are schematic views according to the first embodiment of the present invention. Symbol 1 of Fig. 1 represents the massage device. In the massage device 1, rotational driving force of a motor 18 is

Client's ref.: /2003-12-30  
File: 7051-A2017lusf /Yuchia

transmitted to a rotational shaft 19 of worm and helical  
gears 20, 21, 22 of a driving mechanism 17 to drive  
driving shafts 12, 13, 14. Rollers 9, 10, and 11 of  
bottom therapeutic members are disposed on the driving  
5 shafts 12, 13, 14, respectively. The rollers 9, 10, and  
11 are driven by the driving shafts 12, 13, 14 in a  
predetermined direction. The bottom of a patient's  
forefoot, not shown in the figure, can be placed on the  
roller 9. The roller 10 is disposed at a position  
10 corresponding to an arch of a foot of a patient. The  
roller 11 is disposed at a position corresponding to the  
heel of the patient. Therapeutic protrusions 6, 7, and 8  
are provided on the rollers 9, 10, and 11, for generating  
higher pressure than the pressure provided by the weight  
15 of a patient's foot.

A pair of therapeutic elements 15 and 16 is disposed  
near the rollers 9, 10, clamping the rollers 9, 10 from  
the leftward and rightward directions. The therapeutic  
elements 15 and 16 are designed according to the contour  
20 of the rollers 9, 10. By rotating the driving shafts 12,  
13, and 14, the therapeutic elements 15 and 16 are  
moveable between an approaching position of Fig. 6 and a  
departing position of Fig. 7. In Fig. 7, when the  
therapeutic elements 15 and 16 are outstretched, feet can  
25 be put on the device according to the rollers 9, 10, and  
11. As shown in Fig. 6, when a foot is shut therein, the  
therapeutic elements 15 and 16 clamp to the foot to  
massage and apply pressure thereon from multiple  
directions toward three preset locations: the sole of  
30 forefoot, the arch of the foot and the heel. The rollers

Client's ref.:  
File: 7051-A20171usf

/2003-12-30  
/Yuchia

9, 10, and 11 and the therapeutic elements 15 and 16 are symmetrically and respectively disposed on left and right sides with a certain interval therebetween, and capable of massaging both feet simultaneously.

5           As shown in Figs. 5-7, the therapeutic elements 15 and 16 include massaging bases 45, 46, massaging plates 52, 53, and pressure boards 47, 48. The symmetric massaging bases 45 and 46 are fixed in rotational and axial directions of the driving shafts 12, 13. On the  
10           outer periphery of the massaging bases 45 and 46, the massaging plates 52 and 53 are inserted at an angle with respect to the driving shafts 12, 13 and fixed by a bearing 54 in an axial direction. The pressure boards 47 and 48 are formed on the top end of the massaging plates  
15           52 and 53. Furthermore, to reach the foot and massage the forefoot instep of the patient M, the pressure boards 47, 48 and the massaging plates 52, 53 form a roughly L-shaped cross section. A guiding portion 49 corresponding to the side of the forefoot with a certain degree of  
20           flexibility is formed according to the contour of a forefoot. A flexible member 50 is formed on the opposite side of the pressure boards 47, 48, and the side of the patient's foot. An expandable airbag, not shown in the figure, is disposed between the pair of pressure boards  
25           47, 48 and the flexible member 50. An air supply source on the airbag has a pipe 51 for discharging air. It is possible that the pressure level may become excessive; hence, the pipe is provided with a mechanical valve for safety. Additionally, Symbol 55 represents a pressure  
30           board of the bearing 54. Symbol 56 represents a pressure

Client's ref.: /2003-12-30  
File: 7051-A20171usf /Yuchia

board for holding the massaging plates 52, 53 on the massaging base 45, 46.

5 In Fig. 8, the driving mechanism 17 is formed by a worm gear on the rotational shaft 19 of the motor 18, fixed on the gear case (not shown). The motor 18 is meshed with the helical gear 20 on the worm of the rotational shaft 19, for decelerating rotational speed. The deceleration can be achieved by any means. By meshing with the helical gear 20, the helical gears 21, 10 22 with the same reduction gear ratio face the helical gear 20, which is the intended location for the foot arch. As a result, the helical gears 21 and 22 are disposed facing the sole of the forefoot and the heel, respectively. Furthermore, the helical gear 20 is 15 located higher than the axes of the helical gears 21, 22 and disposed in the vicinity of the therapeutic elements 15 and 16. The helical gear 20 is turned in a direction opposite to the rotational direction of the helical gears 21, 22 by a suitable tool. The helical gears 20, 21, and 20 22 are supported by the bearing 23 for free rotation and fixed on the center of the driving shafts 12, 13, and 14 passing through the gear case 23 and 25 in rotational and axial directions. Thus, each helical gear is rotated accordingly. Symbol 26 is a container for receiving the 25 motor 18.

Each driving shaft 12, 13, or 14 is disposed across the gear case with an adequate interval therebetween, which is roughly equivalent to a shoulders width when feet are placed naturally thereon. The rollers 9, 10, 30 and 11 and the driving shafts 12, 13, and 14 are fixed in



Client's ref.: /2003-12-30  
File: 7051-A2017lusf /Yuchia

the same rotational and axial direction. The rollers 9, 10, and 11 are rotated with the driving shafts 12, 13, 14. The roller 9 and roller 10 are the closest rollers. Compared to the rotational direction of the roller 9 toward the front side, the roller 10 rotates to the back side, in an opposite direction. Thus, the therapeutic protrusions 6, 7, and 8 on the surface of the rollers 9, 10, and 11 are freely rotatable with respect to the rollers 9, 10, and 11.

The rotational shafts 12, 14 of the rollers 9, 11 shown in Fig. 8 are disposed on the same level, facing the position intended to support the patient's foot arch. The protrusion 7 on the roller 10 for the foot arch has a locus closer to the foot arch than the locus of the protrusion 6 on the other rollers 9 and 11 intended to face the sole of the foot, and thus, the rotational shafts 12, 14 support the rotational shaft 13 in the above manner.

The rollers 9, 10, and 11 have mainly the same structure. Thus, the structure of the roller 9 is given as an example in the following explanation. The roller 9, as shown in Figs. 9 and 10, comprises six symmetrical protrusions 6, freely supported between two cylindrical bodies 30 and 30, which are symmetrical and disposed on left and right sides, respectively. The six protrusions 6 are freely and respectively supported by six rods disposed between the bodies 30 and 30.

The operation and structure according to the first embodiment of the present invention is described in the following:

Client's ref.:  
File: 7051-A20171usf

/2003-12-30  
/Yuchia

When placed in the three intended portions of the sole, arch and heel, the rollers 9, 10, and 11 having protrusions 6, 7, and 8 generate higher pressure than can be exerted by the weight of a typical foot placed thereon, and thus, the sole of the foot can be effectively stimulated, particularly in the three mentioned locations, in a short period of time. Additionally, the therapeutic elements 15 and 16 are disposed along the instep of a foot, and thus, even if load is increased on the sole of the foot, which is the intended target portion for stimulation, the therapeutic elements 15 and 16 can prevent the foot from slipping off the device. As a result, effective stimulation on the foot sole can be achieved. Moreover, at least two therapeutic elements 15 and 16 are disposed in the longitudinal direction of a foot. Thus, the therapeutic elements 15 and 16 can provide an effective and wide range of foot massage according to shape.

The adjacent rollers 9, 10 and 10, 11 can potentially rotate in opposite directions, and thus the feet are moved by the rollers 9, 10, and 11, providing smooth foot massage.

A flexible member 50 is disposed on a side of the therapeutic elements 15 and 16 facing the foot arch with a therapeutic protrusion thereon for providing pressure on the patient's instep from above, and thus, when the foot is pressed from above by the flexible member 50, the foot can be prevented from slipping off the massage device by the flexible member 50, thus, effectively stimulating the foot sole.

Client's ref.:  
File: 7051-A20171usf

/2003-12-30  
/Yuchia

5 The therapeutic protrusions 6, 7, and 8 of the  
rollers 9, 10, and 11 are disposed on the outer surface  
thereof and rotatably supported by the driving shafts 12,  
13, 14, facing the rollers 9, 10, and 11. Thus, the  
friction between the foot sole and the rollers 9, 10, and  
11 is reduced, preventing movement of the foot. Namely,  
the foot is more easily massaged. Moreover, the driving  
shaft 13 of the roller 10 facing the foot arch is  
disposed higher than the other rollers 9, 11, thus,  
10 providing better stimulation on the foot arch.

15 The massaging bases 45 and 46 are rotated by the  
driving shafts 12 and 13. The angle at which the bearing  
54 is inserted in the massaging bases 45 and 46 is varied  
with the rotational angle. The massaging plates 52 and  
53 are disposed on the bearing 54 at the same angle as  
the slanting angle of the massaging bases 45 and 46. The  
massaging plates 52 and 53, however, are disposed in the  
opposite direction, approaching the opposite side, such  
that the foot M can be placed in the space therebetween  
for massage. Additionally, since the pressure boards 47  
20 and 48 are formed corresponding to the foot or covering  
the instep, and when the pressure boards 47 and 48  
approach, the foot arch is firmly pressed downward by the  
pressure boards 47 and 48.

25 Since the flexible member 50 is an airbag, the  
flexible member 50 corresponds to the shape and size of  
each foot, providing supported at a constant pressure.  
Additionally, the distance between the therapeutic  
elements 15 and 16 can be reduced regardless of the  
30 restriction in the different foot sizes when the airbag

Client's ref.: /2003-12-30  
File: 7051-A20171usf /Yuchia

is expanded. Thus, the foot is massaged with an adequate strength. Additionally, when the pressure of the airbag is higher than a certain pressure, excess compressed air is discharged by the mechanical valve for safety, suppressing over strong stimulation of the therapeutic parts and increasing durability of the airbag.

Figs. 11 and 12 are schematic views according to the second embodiment of the present invention. Symbols 80 and 81 in Figs. 11 and 12 are substitutes for therapeutic elements 15 and 16. The therapeutic elements 80 and 81 include massaging bases 45 and 46, massaging plates 82, and pressing blocks 84 and 85. The flat massaging bases 45 and 46 are fixed symmetrically on left and right sides, and rotated axially with respect to the driving shafts 12 and 13. On the outer periphery of each massaging base 45 and 46, a massaging plate 82 is fixed axially by a bearing 54 and inserted at an angle with respect to the driving shafts 12 and 13. Each pressing block 84 or 85 is disposed on an opposite side of the top end of each massaging plate 82. Each pressing block 84, 85 and the massaging plate 82 form an L-shaped cross section for massaging the instep of the forefoot. The guiding portion 49 having adequate flexibility, as shown in Figs. 1 and 3, is formed according to the shape of a foot. As a result, by providing firm pressure on instep, the sole of the foot can be thoroughly massaged.

Figs. 13 and 14 are schematic views according to the third embodiment of the present invention. Symbols 90 and 91 in Figs. 13 and 14 are substitutes for therapeutic elements 15 and 16. The therapeutic elements 80 and 81

Client's ref.: /2003-12-30  
File: 7051-A2017lusf /Yuchia

include massaging bases 45 and 46, massaging plates 82, and pressing blocks 92. The flat massaging bases 45 and 46 are fixed symmetrically on left and right sides, and rotated axially with respect to the driving shafts 12 and 13. On the outer periphery of each massaging bases 45 and 46, a massaging plate 82 is fixed axially by a bearing 54 and inserted at an angle with respect to the driving shafts 12 and 13. Each pressing block 92 is disposed on an opposite side of the top end of each massaging plate 82. Each pressing block 92 and the massaging plate 82 form an L-shaped cross section for massaging the instep of the forefoot. The guiding portion 49 having adequate flexibility, as shown in Figs. 1 and 3, is formed according to the shape of the foot. As a result, by securely pressing the patient's instep, the foot sole can be massaged thoroughly.

Figs. 15 and 16 are schematic views according to the fourth embodiment of the present invention. A seat 95 is disposed on the base 96. The bottom therapeutic members 97 and 98 protrude not only out of the seat 95 but also have protrusions thereon facing the sole of the foot. The reflex points in the sole and arch of the forefoot are rotatably pressed by the rollers 99, 100. By applying adequate pressure thereon, the foot can be thoroughly and smoothly massaged.

Figs. 17 and 18 are schematic views according to the fifth embodiment of the present invention. Symbol 101 in Figs. 17 and 18 is a seat disposed on the base 96. The seat 101 has a thru-hole 101a formed thereon. The cylindrical bottom therapeutic member 102 is freely

Client's ref.: /2003-12-30  
File: 7051-A20171usf /Yuchia

movable in the thru-hole 101a between a protruding position and a hidden position. The top of the bottom therapeutic member 102 is spherical, and the base portion 102b is pushed and pulled by an eccentric portion 103, disposed on the driving shaft 13. The head 102a of the bottom therapeutic member 102 protrudes and submerges with respect to the sole of the foot. Thus, the massage device provides effective stimulation particularly on the foot arch.

While the invention has been described by way of example and in terms of the preferred embodiments, it is to be understood that the invention is not limited to the disclosed embodiments. To the contrary, it is intended to cover various modifications and similar arrangements (as would be apparent to those skilled in the art). Therefore, the scope of the appended claims should be accorded the broadest interpretation so as to encompass all such modifications and similar arrangements.